

## Deterioration and conservation of textiles in museums

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Received: 27.04.2012; Accepted: 16.11.2012

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■ **ABSTRACT** : The word textile conservation is defined as the protection of ancient textile objects from damage and deterioration. Antique textiles and costumes can be maintained for years of use and enjoyment provided that some basic attention is given to their care and preservation. Most antique textiles are composed of natural fibres that may include wool, cotton, linen or silk. The first step in the care of textile collections is to understand and minimize or eliminate factors that cause damage. The second step is to follow basic guidelines for handling, display, storage and cleaning.

■ **KEY WORDS** : Textile conservation, Historic textiles, Pests, Pollution

■ **HOW TO CITE THIS PAPER** : Choudhary, Manisha and Babel, Sudha (2012). Deterioration and conservation of textiles in museums. *Asian J. Home Sci.*, 7 (2): 605-607.

**H**istoric textiles are more fragile than many other objects from past eras. Conservation is the application of technical, scientific, and historical analysis to preservation and treatment of artifacts (Landi, 1998). There are two sides to conservation *i.e.* preventive and remedial. Preventive conservation's aim is to recognize the agents and mechanisms of decay and to slow down the process by introducing optimum conditions for preserving the textiles (Mailand, 1980). The organic materials of a delicate nature are more susceptible to get disintegrated and destroyed by the agencies of decay. Many agents contribute to textile's deterioration. These agents of deterioration can occur naturally, or they can result from external forces. Avoiding the agents of deterioration is the key role of preventive conservation. The agents that affect textile collections are:

### Temperature and humidity:

Textile fibres are hygroscopic—they readily take up and loose moisture. Fluctuations of humidity and temperature cause the textiles to take up or loose moisture. These fluctuations cause dimensional changes and mechanical stress that can lead to breakage and structural damage of weak yarns. In museums humidity should be maintained between 55-60 per cent. Textiles can become embrittled when humidity levels

are low. Conversely, permanent staining can occur from mold growth when humidity levels are excessively high. Humidity can be modified with humidifiers or dehumidifiers. Humidity modifiers such as silica gel can be used to control relative humidity in display cases; it comes in many forms, including self-indicating crystals and impregnated sheets. Ideal temperature is between 65° -75° F. Temperature can be controlled with central heating and air conditioning system



Fig. 1 : Silica gel as humidity modifier

Data logger is an instrument for automatic recording of temperature and relative humidity. It records the data of each and every second. So that we can control the environment's temperature and humidity.



**Fig. 2 : Data logger**

### Light (visible and ultraviolet):

One of the greatest threats to textiles in the museum environment is light. The worst damage is caused by ultraviolet (UV) radiations from natural day light and from fluorescent light bulbs; however, UV rays damage most rapidly. The entire light spectrum causes textile dyes to fade and the fibres to become brittle. Visible light is also harmful, although to lesser degree than UV, it must be controlled. An illumination value which is currently being recommended to museum allows a maximum of 150 lux for moderately sensitive and not more than 50 lux for very sensitive objects including textiles. Thus, to control the light following practices must be followed:

- Use of monitoring equipment to identify levels of UV radiation and luminance.
- Reducing the textile's exposure to light by storing and displaying textiles in rooms without windows.
- UV filtering materials or films can be placed over windows and fluorescent light bulbs to reduce UV levels.
- Cover all windows with drapes or blinds to protect textiles.
- Use of automatic dimmer switches, simply turning out lights when visitors are not present.
- Ultraviolet light can be eliminated by the use of ultraviolet filtering glass/ UV resists screens/ shutters/ UV absorbent curtains.

### Pests:

Pests are another significant threat to textile collection in the museums. The term "textile pests" refers to various insects and micro-organisms that eat clothing and other fabric items such as carpet, upholstery, leather goods, and tapestry. A variety of pests can cause structural damage to textiles. These pests include cloth moths, carpet beetles, silverfish, firebrats and rodents/mice. Dirty or stained articles are particularly susceptible to pest attack, so always clean the clothes, fabrics and textiles before storing them. Good housekeeping is the best method of pest prevention. Periodic

inspections and cleaning of storage and display areas provide the cheapest and safest method of prevention. Various chemical and traditional methods are used for preservation of textiles. Chemical methods can be used preventively or curatively. The use of pesticides is generally not recommended. Pesticides and their residues are dangerous to humans and can damage many fabrics. In all the cases, chemical means of pest should be avoided if possible, not only due to harm to humans who come in contact with them but the chemicals may cause damage to the textiles. Various traditional practices, Indian herbal pesticides and insect repellants which are being used to seize the growth of insect infestation in the traditional textiles.

### Recommendations for controlling textile pests:

- Regular inspection and vigilance provide a sound basis for the control of undesirable insect pests and micro-organisms in collection of textiles.
- If possible, the atmosphere in textile museums should be conditioned at 50 per cent relative humidity in order to prevent development of mildew.
- If air-conditioning is impracticable, relative humidity between 50 per cent and 65 per cent should be achieved.
- Constant storage of textiles below temp. of 10°C (preferably 5°C) will prevent damage by insects.
- Insecticides and fungicides should be used preventatively only when other methods of prevention fail.

### Pollution:

Air pollution is also an enemy of textiles. Two major types of pollutants are gases and particulates. Gaseous contaminant- sulphur-di-oxide, nitrogen oxide, peroxides and ozone. Damaging effects of sulphur-di-oxide applies strongly to cellulosic textiles in the presence of trace of iron and many other metals; SO<sub>2</sub> is oxidized to sulphuric acid. This sulphuric acid degrade the cellulosic material. SO<sub>2</sub> can be removed from museum air by passing the air through activated carbon filters or by water spray. Gaseous contaminants can be removed by chemical filters, wet scrubber, or combination of both.

Textiles and costumes are particularly susceptible to dirt present in the atmosphere. Dirt disfigures, dulls, and stains textiles. Dirt and dust also contain a high proportion of silica. The sharp surfaces of silica can cut and abrade textile fibres, especially when the fibres expand and contract in response to changes in RH. Cigarette, cigar and pipe smokes are also harmful forms of pollution.

The following practices must be followed for controlling the pollution:

- Keep doors, windows and outside vents closed whenever possible.
- Never allow smoking or fireplace fires in the building.
- Choose new building materials, paints, and carpeting that do not emit harmful gasses.

- Don't use custodial cleaners that emit harmful gasses (ex. ammonia).
- Use appropriate particulate and gaseous pollution filters.
- Store textiles in closed cabinets with appropriate gaskets.

To control or minimize damage by external pollutants, the installation and regular inspection of air conditioning and furnace filtration is recommended. If specialized chemical filtration (such as carbon) is not available, enclosed display or storage is recommended to help prolong the life of the textiles.

**Inherent instability:**

Antique silk textiles chemically unstable due to a process called "weighting". Weighting involves the addition of metallic salts to silk to add weight and body to the fabric. Silk that has been treated with metallic salts containing iron and tin are particularly susceptible to accelerated degradation resulting in silk that is brittle and frayed. In order to minimize damage to fragile silk objects, physical stress on the fabric should be avoided during storage and display.

Flat storage is highly recommended since it is the most effective method of providing even support for the entire textile. Acid-free, non-buffered tissue should be placed in between folds to give added support. Contact with water should be avoided as it can cause the permanent staining of silk.

**Improper handling:**

A considerable amount of damage can be caused to textiles when they are carelessly handled. Textiles should be laid out on a clean flat surface when examining, cleaning or preparing for storage or display.

- Damage from touching however is usually gradual over time. Textiles absorb salts and fatty substances from skin and eventually they discolor, stiffen and weaken fibres so clean gloves should be worn when touching textiles. If gloves are not available, hands should be frequently and thoroughly washed and dried.
- Large jewellery, rings, belts, and buckles that can snag or tear textiles should not be worn when handling textiles.
- Do not use ink pens or markers on textiles. The use of pencils is recommended to avoid accidental staining.
- Do not place any object on the textile.

- Historic textiles should never be worn. Be aware that textiles that are used (*i.e.* rugs, drapes, costumes) are prone to rapid deterioration.

**Inappropriate storage and display:**

The proper storage and display of textiles can provide protection to avoid the degradation. The size and type of textile will determine the type of storage or display that is appropriate. Costumes, carpets, rugs, linens and clothing accessories all have different requirements.

**Conclusion:**

All textiles become fragile with age and improper environmental conditions. Light, temperature, humidity and air pollution promote the deterioration of textile materials. Deterioration can also be caused by insects, animals, molds and mildew, physical or mechanical stress, and improper previous repairs and treatments. Thus, it is necessary to handle, store and display them properly. So, preventive care and maintenance are the most important things.

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